MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

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WILLIAM HUGGINS, ESQ., F.R.S., President, in the Chair.

Major-General John Baillie, 25 Hamilton Terrace, St. John's Wood;
Thomas Brewin, Esq., 14 St. Nicholas Street, Leicester;
G. Calver, Esq., Hill House, Widford, Chelmsford;
James Campbell, Esq., F.R.G.S., Arkley House, Barnet; and
W. F. Denning, Esq., Tyndale House, Ashley Down, Bristol;

were balloted for and duly elected Fellows of the Society.

The Rev. T. Tordiffe and Mr. J. Garbutt were expelled from the Society for non-payment of arrears of subscriptions.

Note on some of M. Stephan's *New Nebulæ.*

By J. L. E. Dreyer, Esq.

Among the new Nebulæ, the positions of which were given by M. Stephan in the April No. of the *Monthly Notices*, are a few which already have been found before. M. Stephan has himself suspected this in the case of No. 12 of the first list, as he says: "Le No. 12 est peut-être identique avec 440 Lassell." This identity is, however, quite certain, as the Nebula in question has been found independently by D'Arrest, whose position, brought up to 1876, is

$21^h\ 20^m\ 9^s.3 \qquad 97^\circ\ 32'\ 13''$

in perfect accordance with M. Stephan.

With respect to Nos. 1 and 2 of the second list, a comparison with D'Arrest's observations will likewise show that these are identical with H. III. 441 and 442. D'Arrest (who has found near this place several new Nebulæ which seem to have escaped M. Stephan) has the following positions for 1860:—

h	m	s	°	′	″
1	20	18·9	92	38	49
1	20	37·9	92	36	55

while the places of M. Stephan are for 1860 :—

h	m	s	°	′	″
1	20	18·8	92	38	17
1	20	40·8	92	36	15

The "General Catalogue" is therefore wrong with respect to these two Nebulæ, while Auwers finds positions which agree better with the modern determinations.

Through the kindness of M. Stephan I have been able to insert these two lists of Nebulæ in my supplement to the "General Catalogue," which was read before the Royal Irish Academy in February last, and which I hope will soon be in the hands of astronomers. The numerous cases in which Marseilles nebulæ had been discovered independently by D'Arrest or Marth, have shown that M. Stephan almost always estimates the nebulæ far fainter than the other observers of nebulæ. The descriptions "eeF," "presque inobservable," &c. should therefore not deter observers from looking for these objects.

Earl of Rosse's Observatory,
June 1877.

Note on the new Inequalities in the Moon's Longitude, pointed out by Mr. Neison. By S. Newcomb.

The inequalities in the Moon's longitude pointed out by Mr. Neison in the April No. of the *Monthly Notices*, if real, are so important, that I may be permitted to express the desire to see his computations of them published *in extenso*. They are, properly speaking, inequalities of long period in the mean longitude and in the eccentricity and perigee of the Moon, produced by the action of *Jupiter*, admitting of being expressed as follows :—

$$\delta l = +2''\cdot20 \sin(2\varpi - 2J),$$
$$e\delta\varpi = +0''\cdot58 \sin(2\varpi - 2J),$$
$$\delta e = -0''\cdot58 \cos(2\varpi - 2J),$$

ϖ being the longitude of the Moon's perigee, and J the mean longitude of *Jupiter*. The value of the varying angle is

$$2\varpi - 2J = 287^\circ\cdot0 + 20^\circ\cdot65\,(t - 1800\cdot0),$$
$$= 239^\circ\cdot4 + 20^\circ\cdot65\,(t - 1850\cdot0).$$

My present object is to show how strongly the reality of these inequalities is indicated by observations. In No. 3 of Papers

published by the Transit of *Venus* Commission, pages 20–29, I discussed an apparent inequality in the eccentricity and perigee of the Moon, having a period of about $16\frac{2}{3}$ years; an abstract of which discussion is given in the *Monthly Notices* for June, 1876. The notation used was

$$h' = -2\,\delta e,$$
$$k' = \quad 2e\delta\varpi;$$

substituting δe and $e\,\delta\varpi$ for h' and k', the inequality indicated was

$$\delta e = 0''\cdot75 \sin N,$$
$$e\delta\varpi = 0''\cdot75 \cos N,$$

in which the value of N indicated by observations was

$$N = 163^\circ\cdot2 + 21^\circ\cdot6\,(t - 1868\cdot5);$$

and therefore, putting

$$N' = N + 90^\circ = 253^\circ\cdot2 + 21^\circ\cdot6\,(t - 1868\cdot1),$$

the inequalities were equal to

$$e\delta\varpi = -0''\cdot75 \sin N',$$
$$\delta e = \quad 0''\cdot75 \cos N'.$$

We have, then, for the comparison of the angle N′ derived empirically from observations, and the angle $2\varpi - 2J$ of theory

$$N' = 253^\circ\cdot2 + 21^\circ\cdot6\,(t - 1868\cdot1),$$
$$2\varpi - 2J = 261^\circ\cdot4 + 20^\circ\cdot65\,(t - 1868\cdot1).$$

The correspondence is so close that the identity of the two arguments does not seem to admit of reasonable doubt.

What is worthy of remark is, that the period of this argument differs but little from that of the Moon's node, so that the inequalities in question may, for many years at a time, appear to depend on the position of the Moon's node. They will therefore produce apparent inequalities like those containing the Moon's mean anomaly, and the longitude of its node, which have been deduced by the Astronomer Royal in the *Memoirs of the Royal Astronomical Society*, vol. xxix., pp. 13–15.

The inequality of mean longitude will account for the difference between the values of the inequality depending on the ellipticity of the Earth as found from theory and from observations. Hansen's theoretical value is

$$7''\cdot76 \sin\{151^\circ + 19^\circ\cdot34\,(t - 1800)\},$$

while the Astronomer Royal found a co-efficient of 6″·44. Now, in 1800, the argument of Mr. Neison's inequality was 136° greater than that of Hansen. The excess increased from 71° in 1750

to 201° in 1850. The effect of the new inequality was, it will be seen, to diminish the apparent inequality due to the ellipticity of the Earth during the period 1770–1850, the diminution being zero at the first epoch, and attaining its maximum of $2''\cdot2$ between 1840 and 1850.

A more definite statement of the support which the observations give to the inequality of longitude cannot be expressed without a more continuous comparison of Hansen's tables with observations than now exists.

On the Spectra of Comets b and c, 1877. By Lord Lindsay.

Already, on April 11, the spectrum of Winnecke's Comet, (*b* 1877) was seen to consist of three bright lines. Under a very low dispersive power these seemed to be connected by the very narrow continuous spectrum of the nucleus; but on subsequently applying a higher power it was obvious that, although the lines were much widened when the image of the nucleus fell on the slit, still the spectrum was broken up into three lines separated by wide dark intervals.

Measures were obtained with a Browning single prism spectroscope, on April 18, by Copeland and G. Lohse: the resulting wave-lengths in millionths of a millimeter are

556·0 Very faint line.

516·0 Bright line abruptly terminated on the side next the red, but gradually fading away towards the violet.

472·2 Faint line, somewhat sharply bounded towards the red.

On May 5 the same instrument gave wave-lengths 558·0, 508·6, 467·9; the lines being much the same as before.

The following night was very clear, and by using a very low eye-piece the lines were found to be visible, even in a Grubb spectroscope with a large compound prism. The least refrangible of the three lines was now found to be separated into at least three very faint lines, *see figure*. A series of measures gave the wave-lengths as follows:—

569·6 Very faint line.
559·3 } Very faint band.
550·0 }
543·2 Very faint line.
} These form parts of one band.

517·5 }
498·6 } Limits of brightest line.

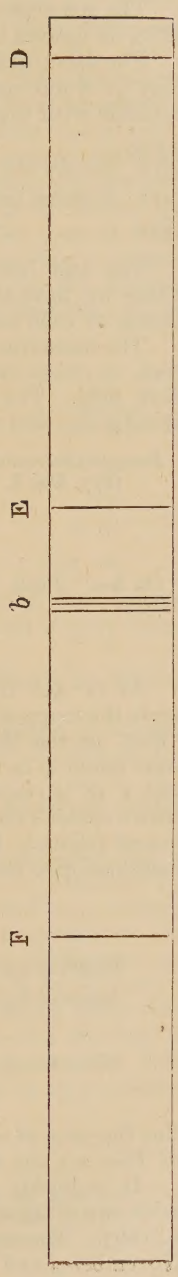
513·4 Brightest part of brightest line.

510·7 Centre of light of brightest line.

470·5 Brightest part of faintest line.

COMET *b* (WINNECKE), 1877, MAY 6.

COMET *c* (BOLELLY), 1877, MAY 6.



The spectrum of this comet much resembles that of Comet II. 1868, as figured by Dr. Huggins in the *Phil. Trans.*

The spectrum of Comet *c* was first successfully measured on May 5: it too consisted of three bright lines, but none of them coincide with those of the other comet. The results are

m.m.m.	
467·6	Faintest line; brightness = 2.
507·9	Brightest line; ,, = 5.
528·2	,, ,, ,, = 3.

The last line is very close to E of the Solar Spectrum. There we have to deal with a comet closely allied to Brorsen's Comet of 1868 and Comet I. 1871.

The measures were all made with a spider's line, or a steel cone, in either case feebly illuminated in an otherwise perfectly dark field. The steel cone is probably the best, as it gives a broader line and requires less illumination.

Dunecht Observatory,
1877, *May* 8.

On two "Flats" on the Moon's Limb, observed March 23, 1877.

By Dr. Ralph Copeland.

(*Communicated by Lord Lindsay.*)

At $11^h\ 50^m$ G.M.T. on March 23, 1877, while preparing to observe the reappearance of κ *Geminorum*, I noticed two remarkable "flats" on the Moon's limb. The position angles of their centres were found to be 264° 28′ and 272° 30′; their lengths being 1′ 39″·1 and 1′ 18″·2 respectively. These depressions coincided sensibly with a spider's line throughout their entire length. Assuming the lowest points to have been exactly on the Moon's limb, the above measures give the following results:—

Depressions of March 23, 1877.

	1st Depression.	2nd Depression.
Length in arc of Moon's limb	5° 46′	4° 31′
Apparent depth	1″·24	0″·78
,, ,, in toises	1125	703
Selenocentric Latitude	−14° 25′	− 6° 1′
,, Longitude	+87 18	+86 41

For the sake of comparison, it may be mentioned that the height of *Pico* is 1,062 toises according to Beer and Mädler.

It is highly probable that these indentations are identical with two of those seen by the Rev. H. Cooper Key on September 6, 1863. The second of them was again seen by Mr. Birt on November 3 and 4, 1864, and still later on November 12, 1875.

But the best observations I have been able to find are by Dr. Erck on November 11, 1875, who observed them with his $7\frac{1}{2}$-inch Alvan Clarke (See *Astronomical Register*, No. 156). His words are: "On laying the thick bars of the micrometer parallel to them I found their position, inverted, to be respectively 153° and 146°. The largest of the two flats was at 153°, and for something more than 3 minutes of arc, corresponding to 12° of lunar latitude, the limb did not deviate from the straight edge of the bar." It is not quite clear what is meant by "inverted" positions, but supposing them to be counted from the parallel—they were measured with the bars—the positions would become 243° and 236°, and would fall on the Moon's bright limb,* and the depressions would be identical with those observed at Dunecht, the results being:—

Depressions of November 11, 1875.

	146° Depression.	153° Depression.
Length in arc of Moon's limb		10° 18′
Apparent depth		4″·05
,, ,, in toises		3599
Selenocentric Latitude	−14° 21′	− 7° 20′
,, Longitude	+85 3	+84 16

The depth is nearly equal to that of *Newton*, the deepest known crater in the Moon, the bottom of which is 3727 toises below the highest peak of the rim.

Guided by the above results, there is no difficulty in coming to the conclusions that—

The 1st of the depressions is most probably caused by the presence of the adjoining ring-plains *Ansgarius* and *Behaim* on the Moon's limb;

And that the 2nd depression is undoubtedly a vertical section of *Kästner*.

Schroeter, who first described the ring-plain *Kaestner*, saw it on the terminator 20 hours after full moon on February 23, 1796. The grey surface of the plain then appeared to be entirely cut off from the Moon by the shadows of the mountains on the eastern margin. On the occasion of its discovery (September 30, 1792) Schroeter found the length from N. to S. to be 3′40″, a measure fairly agreeing with Dr. Erck's "something more than 3 minutes of arc." Beer and Mädler have also seen the floor of *Kästner* separated from the rest of the Moon, but the Rev. Cooper Key seems to have been the first to notice its projection on the Moon's limb.

Dunecht, June 7, 1877.

* 153° and 146° are out of the question, as being on the dark limb; but, fortunately, Mr. Birt's general account of the appearance and position of the depressions on the following evening points positively to a part of the limb near *Kästner*.

Occultations observed at Windsor, N. S. Wales, in the year 1876, *with the* $4\frac{1}{2}$*-inch Equatoreal.* By J. Tebbutt, Esq.

Date of Obs. 1876	Star.	Disapp. or Reapp.	Observatory Mean Time. h	m	s	Estimated angle from Moon's N. Cusp. °	Remarks.
June 2	Spica	D	12	34	7·2	80 E.	Disappearance instantaneous. Obs. a small fraction of a second late.
2	,,	R	13	39	5·2	80 W.	Obs. not so good as that of the disappearance.
July 3	Antares	D	12	14	41·0	50 E.	About one-tenth of a second late.
3	,,	R	13	7	32·9	45 W.	Good observation.
Aug. 26	Star, 8 mag.	D	7	58	11·7	80 E.	Disappearance instantaneous.
26	Star, $8\frac{1}{2}$ mag.	D	8	46	54·6	45 E.	Star extremely faint, and observation uncertain to a second or two.
26	Star, 8 mag.	D	8	53	6·1	45 E.	Star faint.
26	Star, 7 mag.	D	9	1	44·0	50 E.	Very good observation.
26	Star, $4\frac{1}{2}$ mag.	D	9	45	1·4	120 E.	Disappearance instantaneous.
26	Star, 8 mag.	D	9	49	51·7	100 E.	Star rather faint.
26	Star, $5\frac{1}{2}$ mag.	D	10	10	10·0	100 E.	Disappearance instantaneous.
Oct. 28	λ Aquarii	D	7	50	21·6	45 E.	The instant of disappearance was lost owing to momentary removal of eye from telescope. The disappearance could not have taken place more than two seconds previously to the recorded time.
28	,,	R	9	12	51·4		A small fraction of a second late.
28	78 Aquarii	D	9	30	39·7	45 E.	Disappearance instantaneous.

P.S.—*Vulcan* was searched for by me at short intervals on the 22nd and 23rd ult., and occasionally on the 24th, but without success.

Windsor, April 5, 1877.

Observations of α Centauri. By R. L. J. Ellery, Esq., F.R.S.

As I see in the *Monthly Notices* that Mr. Marth has urged observations of *α Centauri* at the present time, I subjoin the results of our observations of this Binary.

From measures obtained in March and April 1877, the distance of the components appears to be 3″·3 and the position 69°·1. In 1862 the position was 0°·0, and distance 10″, since which time the position angle appears to have gradually increased, the distances obtained ranging from 10″ in 1862 down to 8″ in 1874, with an indication of a maximum about 1868.

The close proximity of the components at present, combined with their great brightness, render accurate measure of position a very difficult matter, and also, no doubt, interferes with very precise distance measures. Further measures shall be made, and the results forwarded to the Society.

The following are the only measures recorded at this Observatory :—

	Dist. ″	Pos. °
1863·75	8·5	5·2
1864·72	8·1	...
1868·17	9·2	...
1868·18	9·6	...
1870·65	10·2	...
1873·16	8·3	...
1874·15	8·0	30·5
1876·61	4·5	50·1
1876·62	3·8	52·0
1876·94	4·5	51·2
1877·19	3·3	
1877·21	3·4	
1877·28	2·8	69 1
1877·28	2·98	
1877·28	3·16	

Each result is the mean of from 6 to 10 measures of distance, and from 2 to 10 of position.

The table below gives the position and distance as deduced from our Transit Circle observations of α^1 and α^2 *Centauri*, and although they can scarcely be taken as so accurate as the micrometer measures, they indicate the movement of the system with considerable precision.

Angle of Position and Distance of α^1 *Centauri* with regard to α^2 *Centauri*, from Melbourne Transit Observations.

Year.	Dist.	P.	No. of Measures.
1862·47	...	0	3
	′	°	
1865·56	9·95	17·3	1
1868·51	11·02	21·8	5
1870·65	10·45	24·7	3
1871·51	9·41	24·2	1
1872·55	10·36	24·1	1
1875·94	6·68	39·3	1
1876·90	4·94	64·3	1

Melbourne Observatory,
1877, *April* 17.

On the Collective Light and Distribution of the Fixed Stars.

By John J. Plummer, M.A.

The object of the following paper is to determine within fair limits of approximation the total illuminating power of the stars as compared with some acknowledged photometric standard. In endeavouring to do this I have been led to certain considerations regarding the distribution of the stars in space which are not in accordance with the theory so ably enunciated by Mr. Stone in the March No. of the *Monthly Notices*, but point to a more complicated structure of the sidereal universe. Although readily obtainable from existing data, these remarks may not be the less interesting to the fellows of the Society, as I am not aware that they are to be found elsewhere.

The numbers of the stars of each magnitude are now known with great accuracy for the northern hemisphere, from the careful analysis by Littrow of Argelander's *Survey of the Northern Heavens*. Nothing more satisfactory could be desired as regards the enumeration of the stars. The photometric value of Argelander's scale of magnitudes has been investigated by Pogson. The light-ratio determined by this observer is 2·512, but it will be sufficiently approximate to assume the first decimal place only as accurate. Further, it does not seem possible to fix any inferior limit to the magnitude of the stars which contribute towards illuminating sensibly our Earth, because it is well known that those which individually are too faint to affect the retina of the eye, when congregated in sufficient numbers, become distinctly visible as hazy light; and it would appear that every star, however small or isolated, must aid in the general illumination of the heavens in proportion to its apparent lustre.

The following table has been obtained by combining the two sources of information already mentioned, and gives the number of sixth magnitude stars to which the total light of the stars of the several classes into which Littrow has divided the *Durchmusterung* are equal :—

Class.	Limiting Magnitudes.	No. of Stars in Northern Hemisphere by Littrow and Argelander.	No. of Stars of 6th mag. to which they are equal.
1	1·0 to 1·9	10	646·6
2	2·0 „ 2·9	37	957·0
3	3·0 „ 3·9	130	1344·9
4	4·0 „ 4·9	312	1291·1
5	5·0 „ 5·9	1001	1656·9
6	6·0 „ 6·9	4386	2904·0
7	7·0 „ 7·9	13823	3660·9
8	8·0 „ 8·9	58095	6154·4
9	9·0 „ 9·5	237131	12069·3

If we assume that one-half of the light in class 6 comes from stars that are visible to the naked eye, we shall have the brighter stars equal to 7349, and the telescopic stars down to the 9·5 magnitude inclusive, equal to 23337 standard stars of the sixth magnitude, or that fully $\frac{3}{4}$ of the light of a fine night is derived from stars individually invisible to the naked eye. Next, taking the light of *Sirius* equal to 324 stars of the sixth magnitude, it will be found that the total light of the whole of the stars of the *Durchmusterung* is equal to 10·17 × *Venus* at maximum brilliancy, or to $\frac{1}{78\cdot6}$ of the mean full moon. As these results must be approximately true for any hemisphere of the heavens, it follows that (disregarding the light of the fainter telescopic stars, of whose numbers we have no estimate) the illuminating power of all the stars above the horizon at one time is not less than $\frac{1}{80}$th part of the illumination due to the full moon; but it should be remarked that in this estimate no deduction has been made for the absorption of light in passing through the lower portions of our atmosphere.

With reference to the stars fainter than those here considered, a difficulty presents itself. If their numbers increase in the same ratio as obtains in those for which we have determined a light equivalent, it must be admitted that only a small portion of the stellar light has been here taken into account; and it becomes desirable to determine whether from some cause or other there does not exist a greater number of stars of the 9th and 10th magnitudes than the usual theory of stellar distribution in space will account for. In dealing with large numbers of stars the most probable supposition is, that variations of real lustre will be equalised, and that an average equal distribution fairly repre-

sents the actual condition of things. This amounts to the assumption that distance is the sole cause of variation of magnitude, which, while manifestly untrue for a few stars, must be accepted as approximately accurate for large numbers. If, therefore, we select one of the classes in Littrow's analysis as containing an average number of stars compared with the space included within the limits of distance which the light-ratio assigns, it is easy to determine the number of stars that each of the other classes should contain. I have calculated these numbers for each class, on the supposition that class 8 contains such an average density of the stellar stratum, whose limits are determined by the light-ratio previously used; but, from what has already been said, no great accordance is to be looked for except where a large number of stars are concerned.

Class.	True Numbers according to Littrow.	Calculated Numbers.	Radius of Sphere forming Exterior Limit of Distance (Dist. of 6th Mag. Star=1).
1	10	5	0·156
2	37	15	0·247
3	130	60	0·391
4	312	238	0·618
5	1001	941	0·977
6	4386	3718	1·545
7	13823	14697	2·443
8	58095	(58095)	3·863
9	237131	99631	5·085

An inspection of this table shows that the final class contains a much larger number of stars than can be accounted for in this manner, and further that the comparison would not have been materially altered had either of the four preceding classes been selected as of average density. The significance of this fact may perhaps be more strikingly shown thus. Within the limit 0·39 the numbers of the stars exceed the average, but are too few to admit of our saying decisively that they do not conform to the law of density that prevails at greater distances. From 0·39 to 3·86 one uniform law of stellar distribution prevails, while from 3·86 to 5·08 more than twice that density of stars must be assumed to account for their greatly increased numbers. The use of the light-ratio found by Carrington is equally ineffective to explain the facts, and there appears to me but two suppositions capable of doing so. Either the *Durchmusterung* of Argelander contains many stars (more than one-third of the entire number) which, though rated as 9·5 magnitude, are sensibly below it,* or

* This is equivalent to assuming that the light-ratio, which applies well to the whole of the earlier portions of the scale, fails completely towards the end, and it is a point which I have long had some intention of investigating. At present it is but justice to the deserved reputation of Argelander to assume that his scale of magnitudes is as uniform at the end as elsewhere.

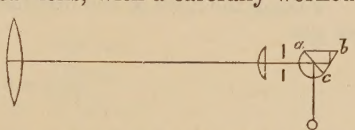
else it must be assumed that, at the average distance for stars of this magnitude, a denser stratum actually exists, succeeded possibly by regions less fruitful beyond. Having been led to the latter conclusion in opposition to preconceived ideas, I cannot but think that the enormously increased ratio with which the numbers of the telescopic stars are multiplied is deserving of increased interest and continued discussion.

Orwell Park Observatory.

A new Solar Eye-piece. By Prof. Zenger.

The Solar Eye-pieces for viewing the Sun by large telescopes were devised for the purpose of getting rid of the obnoxious glare of the solar radiation. By dark coloured glasses, absorbing fluids, reflection from polished glass surfaces, with or without the aid of polarisation of light, it was possible to view the Sun. But all these contrivances could not entirely satisfy the requirements of solar observations; either there was a much diminished field, as is the case in using Dawes's solar eye-piece, or there was a loss of definition by the use of polarising eye-pieces, or by double or triple reflection from the plane surfaces.

To obviate all these hindrances, I imagined a solar eye-piece consisting of a catadioptric lens, the last lens in the eye-piece being replaced by a hemispherical lens, with a carefully worked plane surface, inclined 45° to the optical axis of the telescope. By this replacement the field of view is scarcely affected at all, and the definition is unaltered, or even improved; for the hemispherical lens reflecting the solar rays into the eye at (O) works like a spherical lens, and the curvature may be lessened in comparison with a plano-convex lens in the ratio



$$1 : \frac{2-n}{2}, \text{ or nearly } 1 : 0{\cdot}24 = 25 : 6 = 4\tfrac{1}{6} : 1.$$

There is an equilateral prism placed in optical contact with the plane surface of the hemispherical lens, and denoting by n the index of refraction of the lens, and by n' that of the prism, the intensity of the reflected light by the plane surface ac will be

$$\frac{T_r^2}{T^2} = \frac{\tan^2(\alpha-\alpha')}{\tan^2(\alpha+\alpha')}.$$

The central rays falling on the lens and emerging after reflection, at the angle of 45°, by ac, will be greatly reduced in intensity if there is only a small difference in the reflecting power of the two media.

We get

$$\sin \alpha' = \frac{\sin \alpha}{\frac{n'}{n}} = \frac{n}{n'\sqrt{2}};$$

if $n = 1{\cdot}53$, and $n' = 1{\cdot}544$, we have:—

$$\sin \alpha' = \frac{1{\cdot}53}{1{\cdot}544\sqrt{2}} = 0{\cdot}70695,$$

$$\alpha' = 44^\circ\ 28'\ 58''{\cdot}1,$$

$$\alpha - \alpha' = 0^\circ\ 31'\ 1''{\cdot}9;$$

$$\log \tan (\alpha - \alpha') = 7{\cdot}9555421$$
$$\log \tan (\alpha + \alpha') = 12{\cdot}0730141$$

$$5{\cdot}9125280$$

$$2 \log \frac{\tan (\alpha - \alpha')}{\tan (\alpha + \alpha')} = 1{\cdot}8250560 - 10,$$

$$\frac{\tan^2 (\alpha - \alpha')}{\tan^2 (\alpha + \alpha')} = 6{\cdot}6843 . 10^{-9}.$$

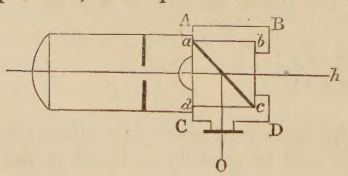
Taking the light of the full moon $= 10^{-6}$ of the solar intensity, we get

$$\frac{T_r^2}{T\,\mathbb{C}^2} = 6{\cdot}6843 . 10^{-3},$$

or the intensity is diminished to 0·007 of the intensity of the full moon as viewed through the telescope.

The diminution of light is sufficient to bear the whole aperture of my four-inch refractor, or of my $4\frac{1}{2}$-inch Browning with reflector, not the slightest trace of heat rays being perceptible at O, in the reflected light from the plane ac, but the radiation at h is sufficient to crack the dark glass and melt it.

It is even possible to leave the eye-pieces unaltered, and to place behind the last lens, as nearly in contact with it as possible, two equilateral reflecting prisms $abb'c$, in optical contact with each other, the hypothenuses ac being in optical contact. Nearly the whole radiation of light and heat is conducted to h, only 7×10^{-9} of it being reflected to the eye at O.



A dark chamber of blackened brass plate is placed round the double prism to get rid of the dispersed light, leaving an opening near the eye.

Both dispositions show the Sun in a most surprising manner, free from any coloration, as an intensely white ball, bluish at the middle, and rapidly decreasing in intensity, the borders being of a greyish yellow tint. A $2\frac{1}{2}$-inch Plösal Dialyse shows the same colour as the 4-inch refractor, though the secondary spectrum in the former is much more visible than in the larger telescope. I suppose this colour to be due to a diminished intensity of light, together with a yellowish ruddy coloration of the borders by the absorption of light in the deeper layer of solar atmosphere through which the light passes.

Prague, March 17, 1877.

Corrections to Struve's Double Stars contained in the Dun Echt Observatory Publications, Vol. I. By Lord Lindsay.

Mr. Burnham of Chicago, U. S. A., has most kindly sent me a list of errata and misprints which he has found in the first volume of my Observatory Publications, while reading it with the MS. of his own general Catalogue of Double Stars. As it may be of service to some of the Fellows, I venture to ask for its insertion in the *Monthly Notices*.

Corrections.

Σ			
80	Colour	*For* ash	*Read* blue
87	Mag. of A	„ 8·5	„ 8·0.
112	Decl.	„ 45° 27′	„ 45° 41′.
300	Decl.	„ 38° 55′	„ 28° 55′.
376	Position	„ 351°·22	„ 251°·22.
444	Name	„ η	„ *n*.
548	Distance	„ 141″·97	„ 14″·197.
563	Decl.	„ 10° 50′	„ 40° 50′.
544	Epoch	„ 30·72	„ 31·72.
635	Decl.	„ 50° 51′	„ 54° 51′.
733	Decl.	„ 15° 57′	„ 15° 52′.
943	Position	„ 155°·90	„ 165°·90.
977	Decl.	„ 48° 45′	„ 48° 39′.
983	Colour	„ yelsh.	„ yel.
990	Decl.	„ −14° 16′	„ −14° 6′.
1012	„	„ 38° 20′	„ 28° 20′.
1058	„	„ 9° 37′	„ 9° 47′ (Pos. Med.)
1062	The Decl. measures and Magnitudes all belong to Σ 1065.		
1066	Epoch	„ 39 72	„ 29·72.

1153	Decl.	*For*	12° 37′	*Read*	12° 20′.
1245	Mag of A	„	8·6	„	6·0.
1292	Decl.	„	0° 6′	„	−0° 6′.
1526	„	„	3° 22′	„	3° 30′.
1525	„	„	49° 9′	„	48° 9′.
1714	„	„	−24° 19′	„	24° 19′.
1727	Position	„	324°·97	„	334° 97′.
1806	Decl.	„	39° 7′	„	49° 7′.
1928	Position	„	227°·65′	„	277°·65.
1949	Decl.	„	13° 47′	„	13° 27′.
2008	„	„	2° 18′	„	−2° 18′.
2036	„	„	52° 49′	„	72° 49′.
2099	„	„	70° 23′	„	70° 35′ (Pos. Med.).
32[1]	„	„	47° 42′	„	47° 32′.
3110	„	„	−2° 45′	„	−2° 25′.
2499	Position	„	329°·43	„	324°·93.
2589	Distance	„	5″·088	„	5″·008
2601	Position	„	116°·05	„	166°·05.
60[2]	„	„	310°	„	210°.

Brook Street,
June 6, 1877.

Correction to Mr. Downing's Paper on the "Determination of the Semi-diameter of Venus at the Mean Distance of the Sun from the Earth," May No., pp. 398, 399.

The Author writes that he has discovered a slight inaccuracy in the computation of the Probable Errors on page 399. The corrections are :—

For $x = 0{\cdot}4439 \pm 0{\cdot}1036 \times e$
read $x = 0{\cdot}4439 \pm 0{\cdot}1369 \times e$;

For $y = -0{\cdot}02068 \pm 0{\cdot}00777 \times e$
read $y = -0{\cdot}02068 \pm 0{\cdot}01151 \times e$;

For semi-diam. $= 8{\cdot}3693 \pm 0{\cdot}0664 \times e$
read semi-diam. $= 8{\cdot}3693 \pm 0{\cdot}0955 \times e$.